

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST – 1 EXAMINATION, SEPTEMBER 2016

B.TECH I SEMESTER (ECE/CSE/IT/CE)

COURSE CODE: 10B11MA111

MAX. MARKS: 15

COURSE NAME: MATHEMATICS - I

COURSE CREDITS: 04

MAX. TIME: 1 HR

Note: All questions are compulsory. Carrying of mobile phone during examination will be treated as case of unfair means. Use of Calculator is not allowed.

1. (a) Show that  $f(x, y) = \frac{x^2 y}{x^4 + y^2}$  has no limit as  $(x, y) \rightarrow (0, 0)$ . (2)

(b) Given that  $z = \frac{1}{x} [f(x-ct) + g(x+ct)]$ , show that  $\frac{\partial}{\partial x} \left( x^2 \frac{\partial z}{\partial x} \right) = c^2 x^2 \frac{\partial^2 z}{\partial t^2}$ . (3)

2. (a) If  $u = \tan^{-1} \left( \frac{x^3 + y^3}{x-y} \right)$ , then find the value of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ . (2)

(b) Expand  $f(x, y) = x^2 y + 3y - 2$  in powers of  $(x+1)$  and  $(y-2)$ . (3)

3. (a) Evaluate  $\int_0^1 \int_r^{2x} e^{y-x} dy dx$ . (2)

(b) Examine the function  $f(x, y) = x^3 + y^3 - 3axy$  for maxima and minima where  $a$  is a real constant. (3)

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